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KATTEN MUCHIN ROSENMAN LLP
575 MADISON AVENUE
NEW YORK, NY 10022-2585

EXAMINER
PATEL, KAUSHIKKUMAR M

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2188	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on _14 December 2006_.

2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) _1,5,9-14,16-18,22,26-31,33-40,42,43,45,46,49 and 50_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) _1,5,9-14,16-18,22,26-31,33-40,42-43,45-46 and 49-50_ is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on _31 March 2004_ is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some * c) ☐ None of:

       1. ☐ Certified copies of the priority documents have been received.

       2. ☐ Certified copies of the priority documents have been received in Application No. _____.

       3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1.   A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 21, 2007 has been entered.

Response to Amendment

2.   This office action is in response to applicant's communication filed December 14, 2006 in response to PTO office action mailed September 21, 2006. The applicant's remarks and amendments to the claims were considered with the results that follow.

3.   In response to last office action, claims 1, 9, 18, 26, 35 and 49-50 have been amended. Claims 2-4, 6, 8, 15, 19-21, 23, 25, 32, 41, 44 and 47-48 have been previously canceled. Claims 7 and 24 have been canceled. No claims have been added. As a result, claims 1, 5, 9-14, 16-18, 22, 26-31, 33-40, 42-43, 45-46 and 49-50 remain pending in this application.

Response to Arguments

4.   Applicant's arguments with respect to claims 1, 12-14, 16-18, 22, 26-31, 33-40, 42-43, 45-46 and 49-50 have been considered but are moot in view of the new ground(s) of rejection.

Admitted Prior Art

5.   Applicant has not traversed the Examiner's assertion of Official Notice with regards to the rejection of claims 36, 37 and 38 in previous office action, therefore the well-known facts presented in these rejections are taken to be admitted prior arts. These facts are summarized as follows: "uses of tape libraries as backup devices and RAID for data redundancies are well known in the art".

Claim Objections

6.   Claims 22, 26-31, 33-34 and 49 are objected to because of the following informalities:

Claims 22, 26-31 and 33-34 depends directly or indirectly on claim 18 and claim 18 claims computer readable medium, while preamble of claims 22, 26-31 and 33-34 recites computer executable code of claim 18 (or 24, 26 etc.). It should be properly corrected to read "computer readable medium of claim 18" or "computer readable medium having stored thereon computer executable code".

Claim 49 reads "The apparatus of claim u, wherein" in line 1. It should be "The apparatus of claim 35, wherein".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

7.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter, which the applicant regards as his invention.

8.   Claims 1, 5, 9-14, 16-18, 22, 26-31, 33-40, 42-43, 45-46 and 49-50 are rejected

under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly

point out and distinctly claim the subject matter which applicant regards as the

invention.

Claim 1 recites the limitations "a write request initiated by said host by writing a

new data chunk", "a destination address" and "a location designated by said host" in

lines 4, 5 and 13, the term "new" is open to interpretation, is the method only performs

on-line write request, when host issues request to write new data? The terms "a

destination address" and "a location designated by said host" are also open to

interpretation. It is not clear whether they (terms) refer to new destination address and a

new location or the destination address and the location recited in lines 5 and 11 of the

claim. Claim 1 further recites the limitation "a location designated by the destination

address in a snapshot storage element". It is not clear how the destination address

provides locations in two different storage devices, because as recited in line 5 of the

claim, a destination address is provided with the write request by the host, which refers

to the location in production storage and again as recited in line 11, the destination

address refers to the same address provided with the write request and thus it refers to

the location in the snapshot storage elements as per line 11 of the claim.

Claims 18 and 35 also contains similar ambiguities as of claim 1 and thus

rejected under same rationales as applied to claim 1.

Claims 5, 9-14, 16-17, 22, 26-31, 33-34, 36-40, 42-43, 45-46 and 49-50 are also

rejected due to their dependence on rejected claims.

Claim Rejections - 35 USC § 103

9.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

10.   Claims 1, 5, 9-14, 16-18, 22, 26-31, 33-40, 42, 45-46 and 49-50 are rejected

under 35 U.S.C. 103(a) as being unpatentable over Lam et al. (US 2005/0172092 A1),

Applicant's Admitted Prior Art (incorporating Armangau (US 6,434,681 B1)) (AAPA

herein after) and Cabrera et al. (US 6,708,227).

As per claim 1, Lam teaches a method for enabling the execution of at least an

I/O operation by at least a host on at least a production storage element **(fig. 1, client**

may transmit to primary storage system one or more data write commands,

paragraph [0031]); said method comprises the steps of:

a) on-line performing a write request initiated by said host by writing a data chunk

to a journal **(storage manager receives from client a data write command**

containing a data item and inserts the data item into staging device (journal),

although Lam does not explicitly teach on-line, it is inherent in the system of Lam

the write task is performed and the data is stored in the staging device and host

is acknowledged of write completion is equivalent to on-line write {paragraphs

[0052] and [0060]}, **because after sending write complete acknowledgment, the**

storage manager processes additional data processing requests from clients

{paragraph [0008] and [0052]}, **and saving a destination address designated in said**

write request in a changes table {par. [0049], [0052] and [0060]}, **storage manager**

inserts the data item into staging storage device along with the metadata, where it

is readily apparent that metadata includes destination address and it is also

known in the systems where data caching is used, **the cache** (staging device)

includes a changes table to mark data in the cache as valid, invalid etc. to keep

the data coherent with the data stored in the disk), wherein while on-line performing

said write request the host is idle **(additional data processing requests from client**

are processed only after the write complete has been transmitted to client, where

it is readily apparent that the client waits until the write complete

acknowledgement is received and thus the client is idle during writing data to

staging device and up until the acknowledgement is received, {par. [0052]});

b) generating a response message ending the execution of said write request

and thereby enabling said host to execute said I/O operations **(storage manager**

transmits a write complete message to the client, {paragraphs [0052] and [0060]}.

Lam teaches asynchronous writing method in a default mode {par. [0060]} **and in**

asynchronous writing the data is written to cache (staging device) **and then when host receives an acknowledgement of write complete, then the host is free to perform additional I/O operations and does not wait for acknowledgment for data written in the disk devices at a later time).**

Lam teaches copying (back up) user data from staging (journal) device to primary and secondary storage devices (pars. [0053], [0060]), but fails to teach producing snapshot copy of primary device. AAPA teaches that backup and snapshot are two techniques for increasing data reliability in storage systems and snapshot saves original copy of data before data being modified and thus preserves the original data to different/same storage device such that if the original data is corrupted then data is quickly restored to point-in-time just before the data corruption has occurred. (AAPA, page 1, paragraph 3). Cabrera also teaches that snapshot may be used like a backup copy of a volume, but it is much faster to create than a full backup (Cabrera, col. 2, lines 48-55) and it is less resource intensive backup process (Cabrera, col. 2, lines 12-16).

It would have been obvious to one having ordinary skill in the art at the time of the invention to use snapshot technique as taught by AAPA in the system of Lam because snapshot saves original data to different/same storage device before being modified, thus providing point-in-time recovery of data (AAPA, page, paragraph 3) and snapshots are much faster to create and less resource intensive, thus improving backup capabilities of storage system (Cabrera, col. 1, line 67 – col. 2, line 57).

Thus, Lam, AAPA (incorporating Armangau (US 6,434,681 B1) and Cabrera combine teach:

c) off-line producing said updated snapshot copy of said production storage

element by copying a data chunk residing in said production storage element

designated by a destination address to a location designated by the destination address

in a snapshot storage element; and copying said new data chunk from said journal to a

location designated by said destination address in said production storage element

(Armangau, col. 2, lines 11-34, **it is noteworthy though, Armangau teaches host**

writing data to production storage and does not mention host writing data to

journal device (or cache), **he teaches cached storage system** (Armangau, col. 8,

lines 57-58) **and data is cached, i.e. host accesses data to/from cache and then at**

some point in time data is flushed/written back to storage (primary) **device and**

thus the meaning when host writes data to primary storage device can be

interpreted as host initially writes data to cache and then when data is flushed

(write-back), **the original data chunk is read from production volume and written to**

snapshot volume and new/modified/dirty data is written in place of original data

[Armangau, col. 10, lines 50-65, *"when port adapter receives a data storage access*

request from one the hosts", *"the port adapter accesses primary directory in the cache*

and determines whether or not the data resides in the cache". *"The storage device also*

performs a write-back operation to ensure that data is written to the cache memory

eventually becomes written to the disk array"]);

wherein while off-line producing said updated snapshot copy said host is

released to handle said I/O operations (Lam teaches sending write complete

acknowledgement to client after writing data and later it writes data to primary and

backup devices (Lam, par. [0052], [0060]), thus it is readily apparent that when host receives an acknowledgment after writing data to staging device, the host is free to handle additional I/O operations).

As per claim 5, Lam teaches staging device as non-volatile memory (paragraph [0035]).

Claims 18 and 35 are rejected under same rationales as applied to claim 1 above (Lam teaches method can be performed by programmed processors executing blocks, par. [0099]).

Claims 22 and 39 are rejected under same rationales as applied to claim 5 above.

As per claim 49 Lam teaches sending a write complete acknowledgment to host as explained with respect to claim 1 above, which means ending the execution of write request.

As per claims 9, 26 and 50, Armangau (AAPA) teaches checking of data chunk to see if data chunk is modified since last snapshot and if data chunk is not modified than copies data chunk from production volume to snapshot volume (see Armangau, column 2, lines 12-34).

It would have been obvious to one having ordinary skill in the art at the time of

the invention to modify Lam's storage system by teachings of Armangau to check the

data chunk for modification and copying data from primary to snapshot volume by doing

one can restore the previous data from snapshot volume if there is any fault or

interruption in system and also one can create point-in-time backup copies.

Armangau fails to teach copying new data chunk to production storage if data

chunk has been modified. It would have been obvious to one having ordinary skill in the

art to write data chunk directly to production storage if data chunk was modified after

snapshot, because once snapshot is taken than the original data is already saved to

snapshot device and thus if data corruption occurs during overwriting modified data to

production storage, the original data still be recovered from snapshot device (well

known benefit of snapshot).

As per claims 10, 11, 27 and 28, Lam teaches metadata of data item, which

contains identification for assigned data block storage location (paragraph [0031]) and

converting logical address to physical address (paragraph [0043]).

As per claims 36, 37 and 38, Lam teaches that primary and backup devices with

disks (paragraph [0032]) and virtual drives (paragraph [0042]), thus Lam inherently

teaches storage elements with disk and either physical or virtual volumes. Lam fails to

teach tape libraries but uses of tape libraries as backup devices and RAID for data

redundancies are well known in the art and Examiner takes official notice of that.

With respect to claims 12-14 and 16-17, Armangau teaches a cached storage

subsystem (Armangau, col. 8, lines 57-58) and teaches:

a) checking if data chunk requested to be read resides in said journal (cache);

b) retrieving said data chunk from said journal (cache) and further sending said

data chunk to said host, if said data chunk resides in said journal (cache); and

c) retrieving said data chunk from said production storage device and further sending

said data chunk to said host, if said data chunk does not reside in said journal (cache)

(claim 13) (Armangau, col. 10, lines 50-67). Lam teaches host access request including

metadata as explained with respect claim 1 above and virtual storage devices (Lam,

par. [0042]) and performing logical to physical address conversion in case of virtual

volume as per claim 11 above. It is inherent feature of read request to include source

address of the data block to be read thus satisfying limitations of claims 12, 16 and 17.

Armangau teaches checking directory entry (Armangau, col. 10, lines 52-55) satisfying

limitation of claim 14.

Claims 29-31, 33-34, 40 and 45-46 are rejected under same rationales as

applied to claims 12-14 and 16-17 above.

With respect to claim 42, Armangau teaches a storage controller (Armangau, col.

10, line 33).

11.   Claim 43 is rejected under **35 U.S.C. 103(a)** as being unpatentable over Lam et

al. (US 2005/0172092 A1), AAPA/Armangau (US 6,434,681 B1) and Cabrera et al. (US

6,708,227) as applied to claim 35 above and further in view of Kumar et al. (US

2003/0131182 A1).

As per claim 43, Lam, AAPA/Armangau and Cabrera fail to teach virtualization

switch in storage area network (SAN). Kumar teaches benefit of storage virtualization

(Kumar, par. [0005]) and implementing virtualization in storage area networks through

various devices (e.g. at host, at storage adapters and switches) (Kumar, pars. [0006] –

[0007]). It would have been obvious to one having ordinary skill in the art at the time of

the invention to use virtualization switch as taught by Kumar in the system of Lam,

AAPA/Armangau and Cabrera because a network appliance placed between host and

the storage device (i.e. a switch) globally manages the mapping allocation between

virtual and physical devices and thus virtual volumes can be implemented

independently from both the host and the storage subsystem thereby providing higher

level of security (Kumar, par. [0010]).

Conclusion

12.   The prior art made of record and not relied upon is considered pertinent to

applicant's disclosure.

Nagasawa et al. (US 6,684,306) teaches performing asynchronous data backup

system, wherein host writes data in the cache and then host is sent an

acknowledgement of write complete and later in time data is written to primary and secondary storage systems.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaushikkumar Patel whose telephone number is 571-272-5536. The examiner can normally be reached on 8.00 am - 4.30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hyung Sough can be reached on 571-272-6799. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kaushikkumar Patel
Examiner
Art Unit 2188

kmp

HYUNG SOUGH
SUPERVISORY PATENT EXAMINER